

Insects as a window into the world



Shyamal

"Don't accept the chauvinistic tradition that labels our era the age of mammals. This is the age of arthropods. They outnumber us by any criterion – by species, by individuals, by prospects for evolutionary continuation." – Stephen Jay Gould

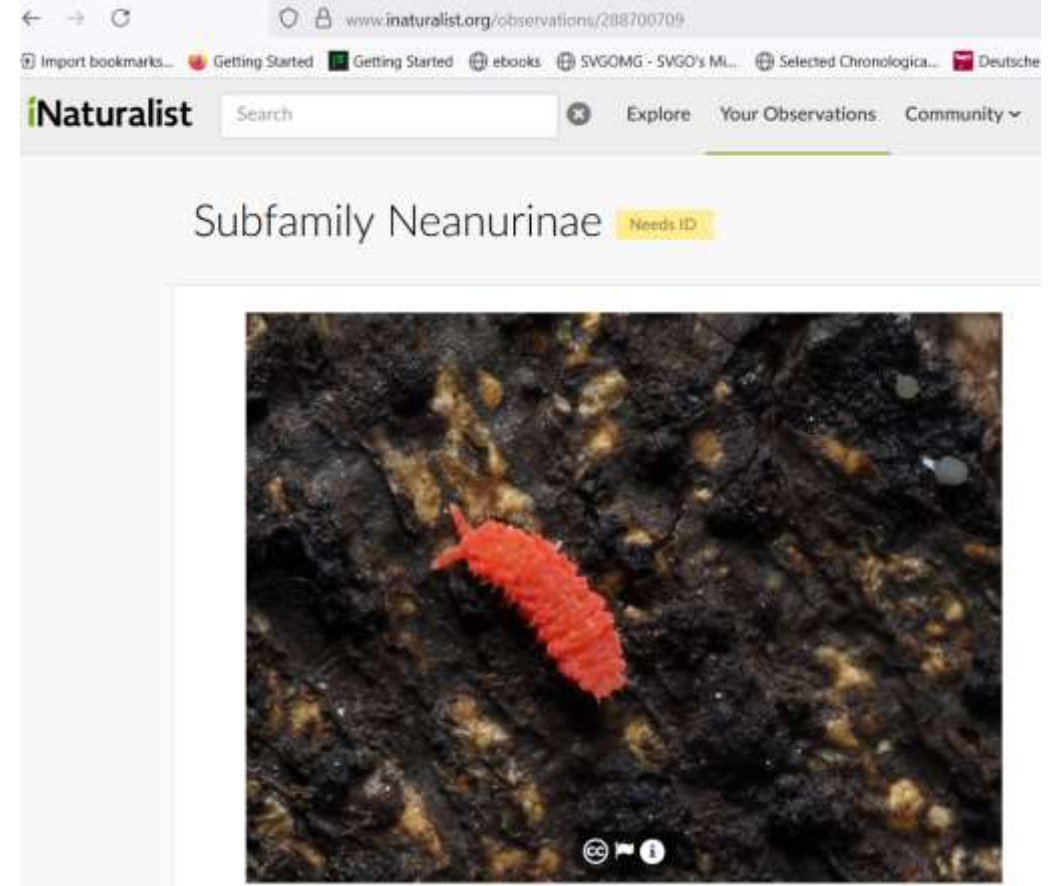
Who is this discussion for?

- Not for knowing how to “identify” insects ...
- For those who have started to look at insects, take pictures and post them to iNaturalist, seeking “identification” - What is it?
- Oh wow! It is undescribed! Unknown to science! It is an endemic!
- Why are most of the images identified by people like “Michael”, “Boris”, and “David” ... only rarely by a “Sankararaman” and almost never by someone from the Zoological Survey of India(!)?
- For those who ask
 - “Why is there no field guide to Indian insects?”
 - “Why is there no book on insects in X language?”
- What can I examine if I cannot “identify” the insect?

What we allude to

- The context of development of entomology elsewhere and in India
- The general absence of people with a “profession” in entomology
- A general poverty of libraries, museums – and associated professions – research librarians – curators
- Non-hierarchical and anti-authoritarian culture is fundamental to science
- Science as a very restricted subculture
- The non-existence of the “university” in its original sense in India
- The options for those of us interested in insects

After 4 decades, Zoological Survey of India records discovery of 2 new springtail species in West Bengal

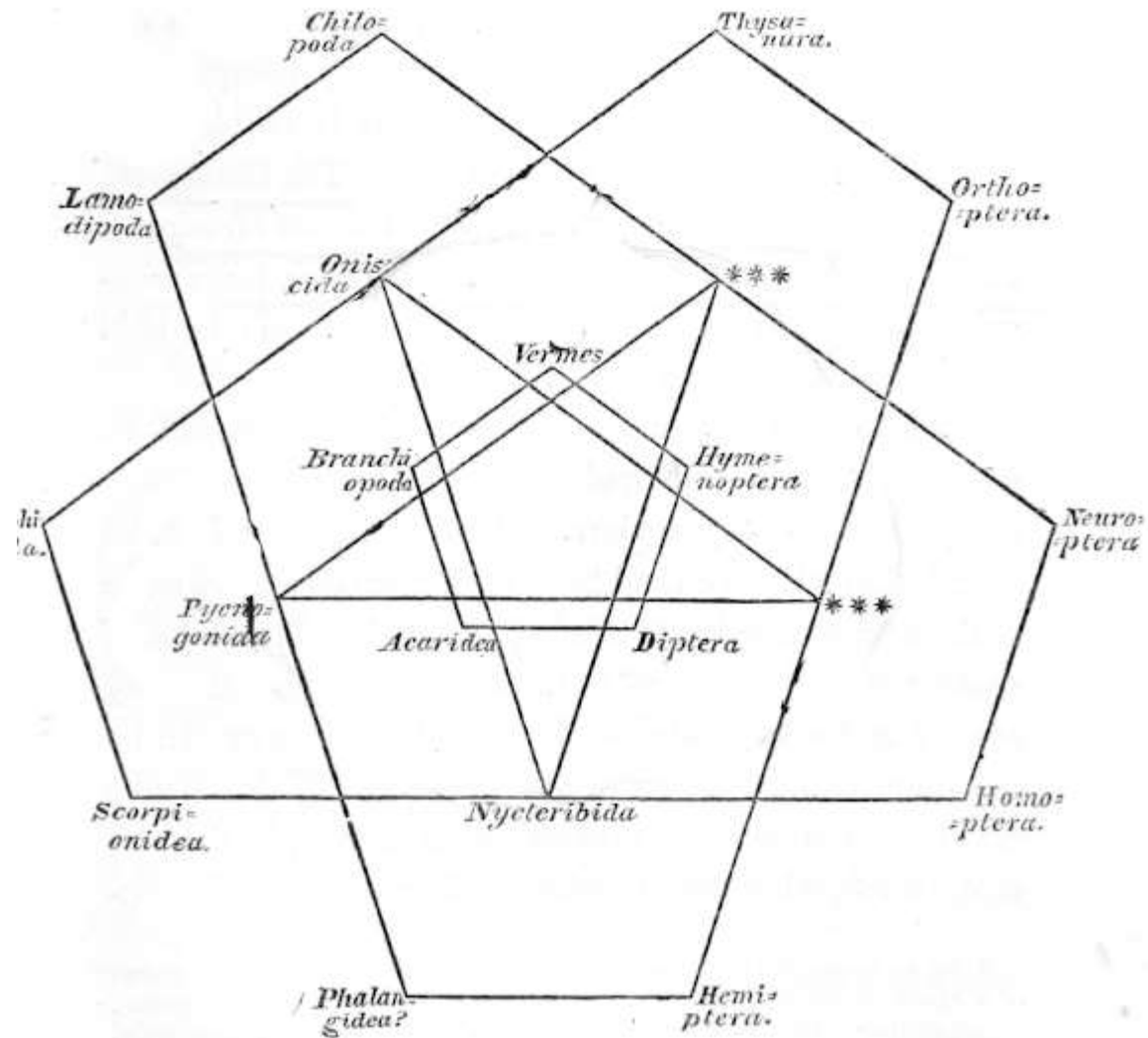


*Understanding the motivations of entomology, the state of knowledge,
and keeping expectations realistic*

The naming of the beasts



- “Admiring the creations of god” as a virtue
 - Christianity - Protestants
- Wunderkammer or Cabinets of Curiosity
 - Wealth and leisure
- Linnaeus suggests a system - 1758
- Printing technology
- Industrial revolution
- “Learned Societies” form
 - Journals are born
- Colonialism feeds into the collections
- Public museums and research collections
- Darwin & Wallace – 1859
- “Naturalism”



▪ Nothing in Natural History is, perhaps, more curious than that these analogies should be represented by a figure so strictly geometrical. One is almost tempted to believe that the science of the variation of animal structures may, in the end, come within the province of the mathematician.

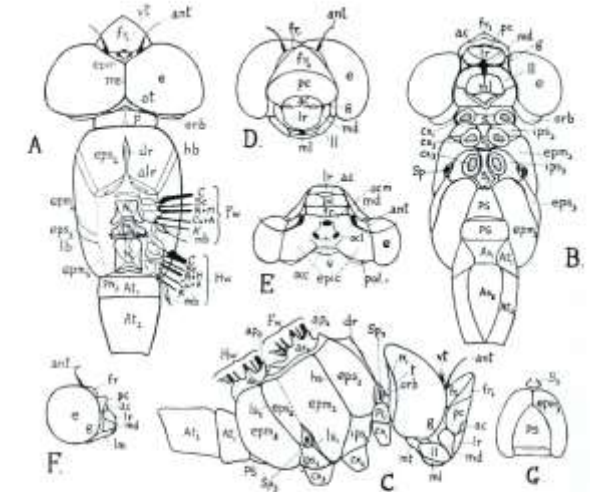
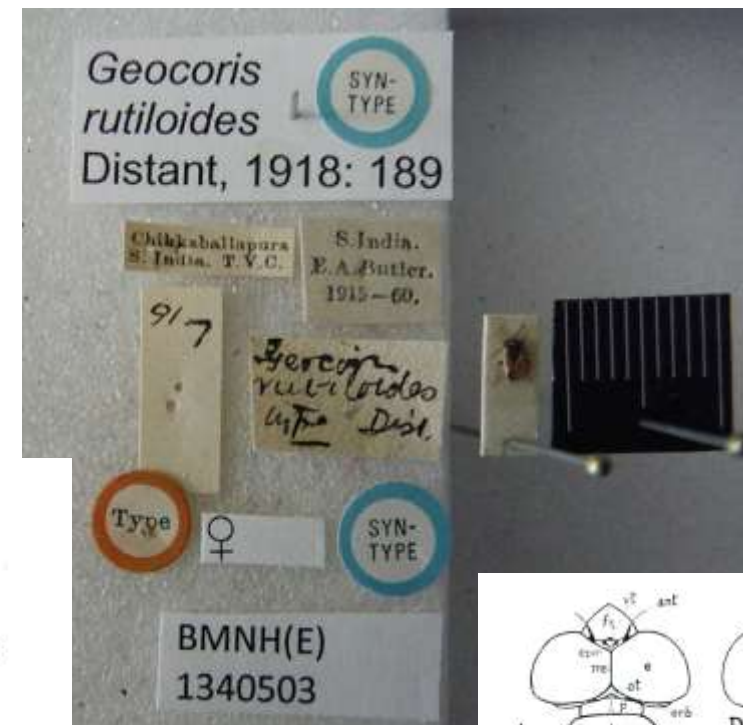
A language develops

- Type specimens – “objectivity”
- Descriptions
 - Keys
 - Revisions
- Group specialists

FAMILIAR INTRODUCTION
TO THE
HISTORY OF INSECTS;
BEING A NEW AND GREATLY IMPROVED EDITION OF
THE GRAMMAR OF ENTOMOLOGY.
BY
EDWARD NEWMAN, F.L.S., Z.S., &c.



LONDON:
JOHN VAN VOORST, PATERNOSTER ROW.
1841.

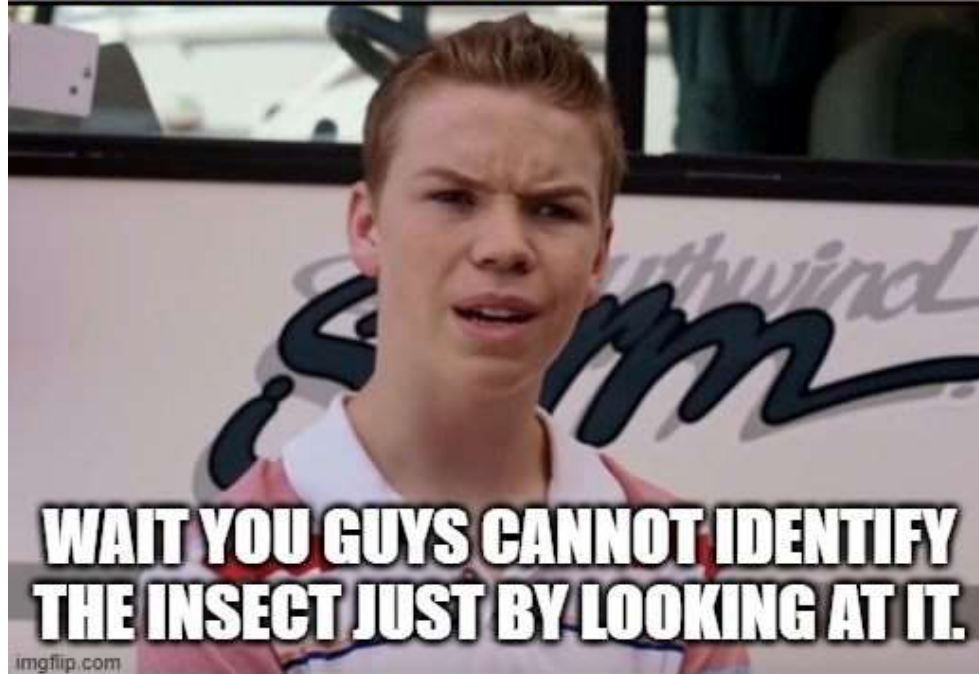


Exoskeleton of head, thorax, and first two abdominal segments. A. *Austrophlebia costalis* Tillyard, ♂, dorsal view. B. The same, ventral view. C. The same, lateral view. D. Head of the same, front view. E. Head of *Leodes*, dorsal view. F. The same, lateral view. G. Metathorax of *Orthocentrus*, ventral view. A: analis; A' secondary analis; ac: anteclypeus; ab: ante-abax ridge; ant: antenna; ap: costal process; As: urosternite; At: urotergite; ax: axillary; C: coxal; Cu: cubitus; ex: coxa; dr: dorsal carina; e: eye; ep: epicranium; epn: epimerum; eps: episternum; fr: frons; fr₁: its superior, fr₂: its anterior portion; Fw: fore-wing; y: gena; As: humeral suture; H: hind-wing; iys: infra-episternum; ll: lateral lobe of labium; ls: labium; lr: labrum; ls₁: first, ls₂: second lateral suture; M: media; mb: membranule; md: mandible; me: median eye-line; ml: median lobe of labium; mt: mentum; N: nutum; ocl: ocellus; ocl: lateral, ocl: median ocellus; orb: orbit; ot: occipital triangle; P: prothorax; pc: postclypeus; Pl: pleurum; PN: postnotum; psd: postocular lobe; PS: post-sternum; R: radius; S: sternum; Sc: subcosta; Sp: spiracle; t: temple; v: vertex; vt: vertical tubercle. (A-B and G x 2; C, E x 5½.) Original.

Professions develop

- Agricultural pests
 - Locusts and transnational entomology – killed off by insecticide innovations
- Medically important insects
- Allied areas
 - Genetics
 - Developmental biology
 - Ecology and evolutionary biology

**ENTOMOLOGISTS GENERALLY NEED TO
DISSECT THE INSECT TO IDENTIFY THEM.
BUTTERFLY SCIENTISTS:**



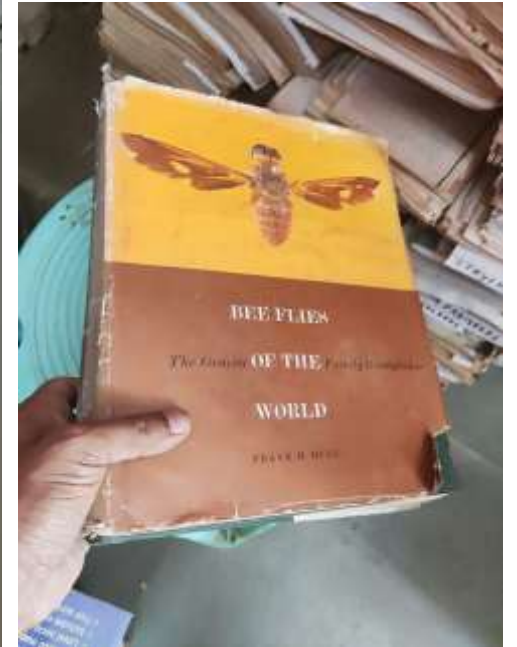
**WAIT YOU GUYS CANNOT IDENTIFY
THE INSECT JUST BY LOOKING AT IT.**



ZOOLOGY.

Railway Porter (to Old Lady travelling with a Menagerie of Pets). "STATION MASTER SAY, MUM, AS CATS IS 'DOGS,' AND RABBITS IS 'DOGS,' AND SO'S PARROTS; BUT THIS ERE 'TORTIS' IS A INSECT, SO THERE AIN'T NO CHARGE FOR IT!"

Infrastructure – name indexes



Beyond the names

- What is a species?
- What is an organism?
 - What about symbionts?

Jonathan Swift



So, naturalists observe, a flea;
Hath smaller fleas that on him
prey; And these have smaller
fleas to bite 'em, And so
proceed ad infinitum.

'I don't *rejoice* in insects at all,' Alice explained, 'because I'm rather afraid of them—at least the large kinds. But I can tell you the names of some of them.'

'Of course they answer to their names?' the Gnat remarked carelessly.

'I never knew them to do it.'

'What's the use of their having names,' the Gnat said, 'if they won't answer to them?'

'No use to *them*,' said Alice; 'but it's useful to the people who name them, I suppose. If not, why do things have names at all?'

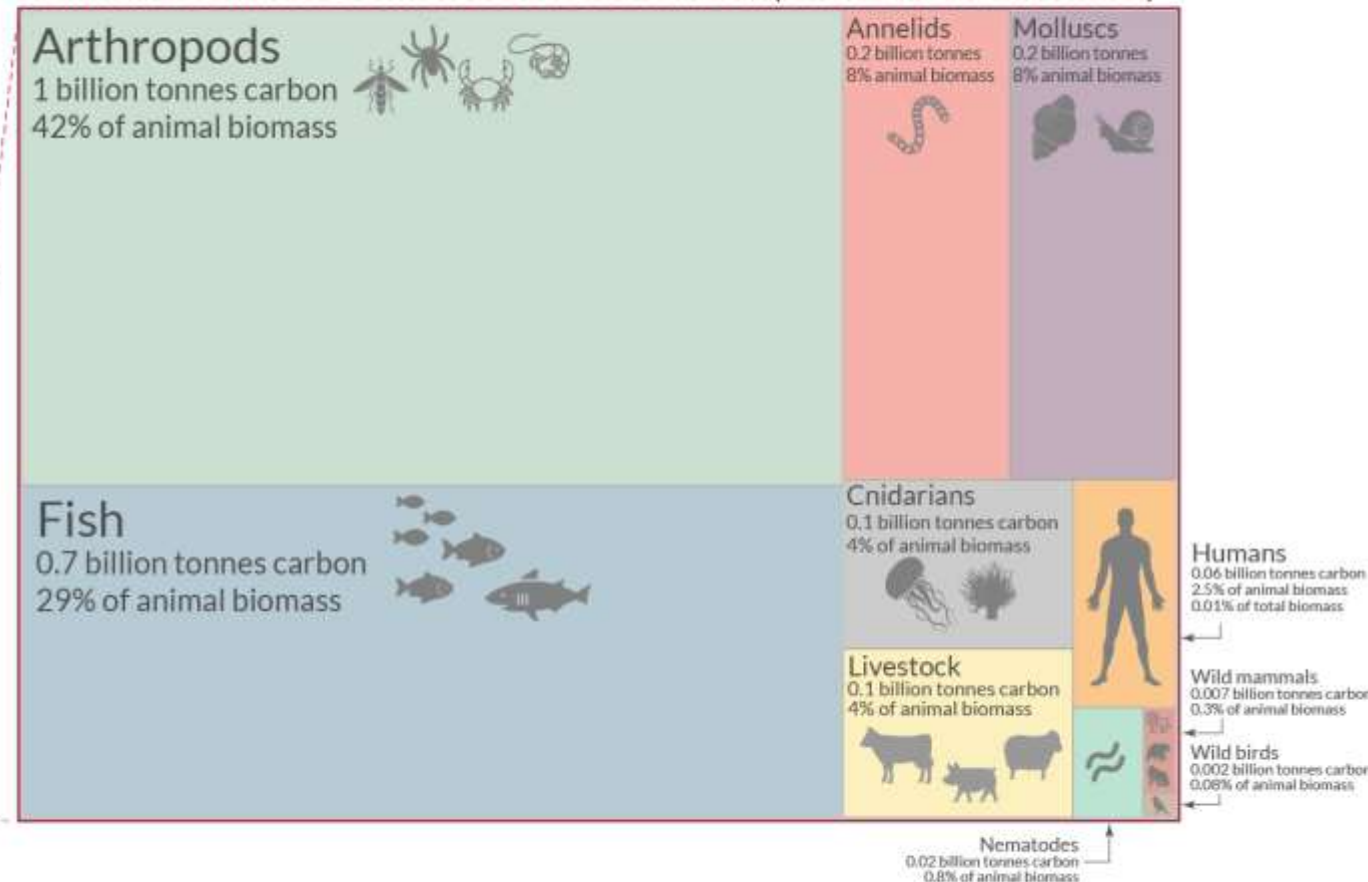
Life on Earth: the distribution of all global biomass

Biomass is measured in tonnes of carbon. The global distribution of Earth's biomass is shown by group of organism (taxa).

Global biomass: 546 billion tonnes of carbon



Animal biomass: 2 billion tonnes of carbon (0.4% of total biomass)



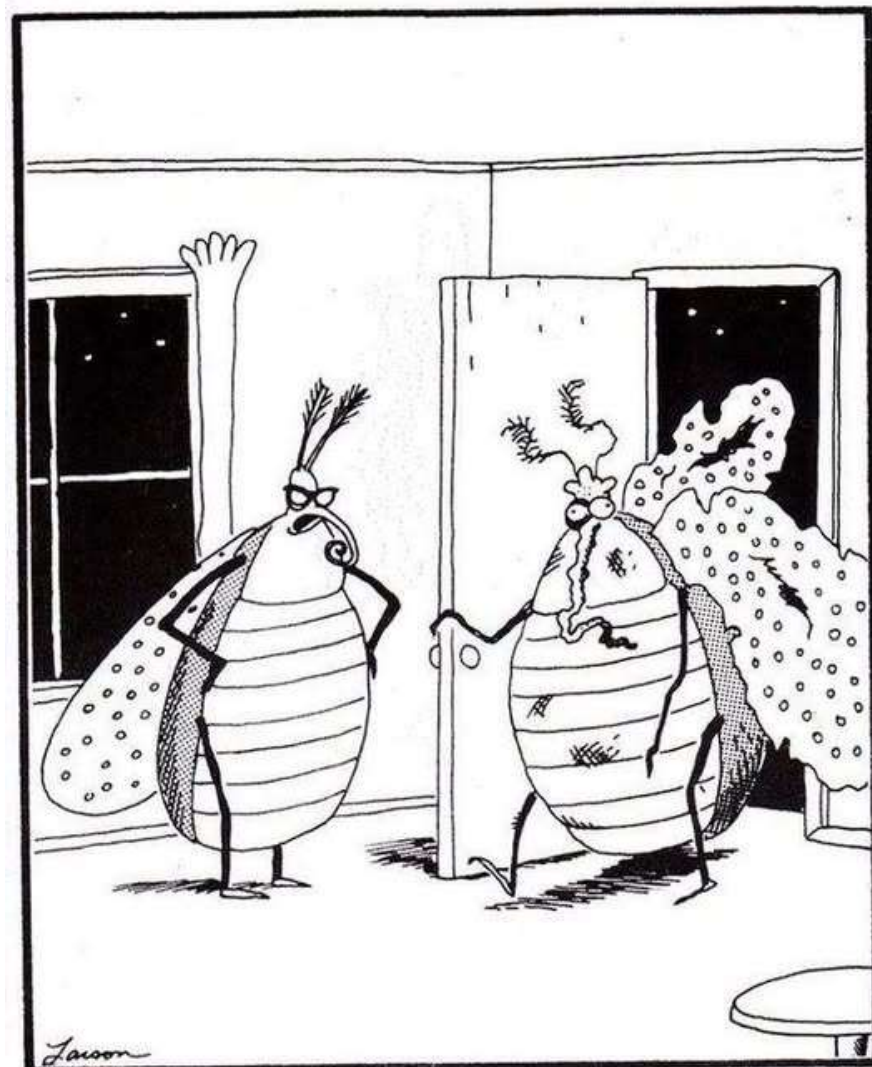
Data source: Bar-On, Y. M., Phillips, R., & Milo, R. (2018). The biomass distribution on Earth. *Proceedings of the National Academy of Sciences*. Icons from Noun Project.

OurWorldinData.org – Research and data to make progress against the world's largest problems.

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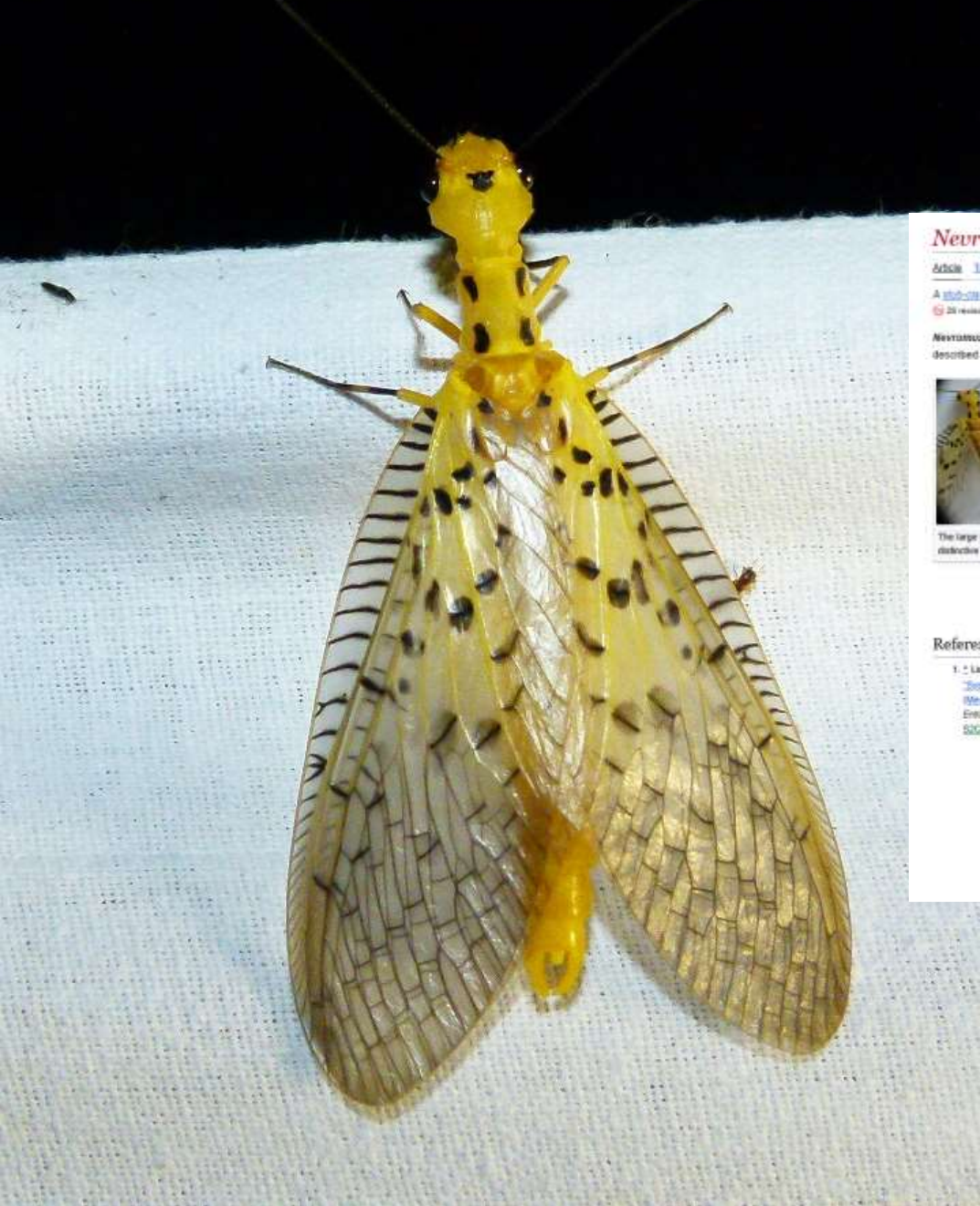


"An excellent specimen ... the symbol of beauty, innocence, and fragile life. ... Hand me the jar of ether."



"Good heavens—just *look* at you! You've been down at the Fergusons' porch light, haven't you?"





Neuromus austroindicus

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28 revisions since [2012-08-17](#) ([view diff](#)), 14 editors: [Sudhakar](#) (10 days), created by: [Sudhakar](#) (118 days) [View Neuromus austroindicus](#)

Neuromus austroindicus is a species of damselfly found in the [Western Ghats](#) of India. It is one of two species of the family [Zygoptera](#) found in southern India, the other being *Aeshna malabarica* (Walker, 1853). It was formally described in 2012 on the basis of specimens from the Karnataka Western Ghats of [Kudremukh](#) with some specimens also obtained from near [Bangalore](#). They are closely related to species found in mainland China.



The large spots on the base of the forewing are distinctive

The adult is characterized by the forewings having black spots on the crossveins which are larger than on other species in the genus. The male genitalia have a uniquely shaped tenth gonocoxite. The head and thorax are yellow. The yellow ocelli are found on a ridge of the head marked by a small black spot. The species name austroindicus means "south Indian", referring to its restricted distribution.^[1] The larva is not described but it is expected to be found in montane streams where it is an active predator. Like other tropical members, they may take about two years to metamorphose into adults.



Specimen from Chikmagalur



Head

References

[edit](#) [edit source](#)

- ↑ Liu, Xingyu; Pami Hanyash; Chandra A. Venkatesh; Qing Yang (2012). "Systematics and biogeography of the damselfly genus *Neuromus* (Zygoptera: Libellulidae: Libellulidae) from the Oriental region". *Systematic Entomology*. **37** (4): 467–489. doi:10.1111/j.1365-3113.2012.00606.x. [S2CID 9463362](#).

Neuromus austroindicus

Adult role

Scientific classification

Kingdom:

Animalia

Phylum:

Arthropoda

Class:

Insecta

Order:

Megoptera

Family:

Zygoptera

Genus:

Neuromus

Species:

N. austroindicus

Binomial name

Neuromus austroindicus

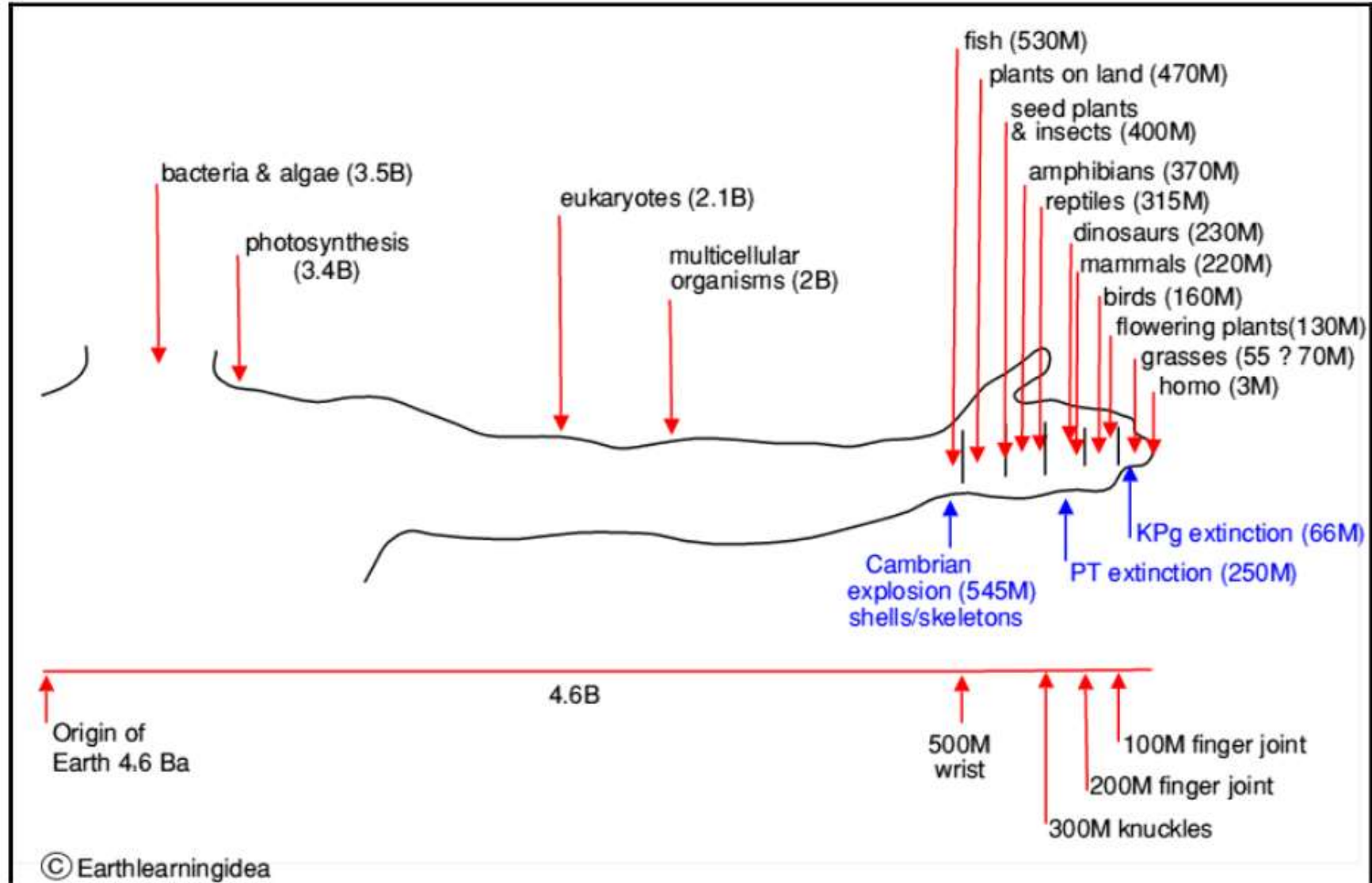
Liu & Yang, 2012



“... setting aside vertebrate chauvinism, it can be said that essentially all organisms are insects.” – R. M. May

“An inordinate fondness for beetles” – J. B. S. Haldane
(apocryphal)

“Nothing in Biology Makes Sense Except in the Light of Evolution” – Theodosius Dobzhansky



The evolution of some major groups of organisms, scaled to fit an outstretched arm

The living insects – topics to think about

- Oldest animal group to diversify on the land

- Longest interactions with land plants

 - dominant herbivores!

- Metamorphosis and complex life histories

- Adaptations for flight, sound and light production

- Freshwater habitats

- The use of colour

 - avoiding predators

 - communication

- The use of chemicals

 - finding food / mates

 - avoiding predators

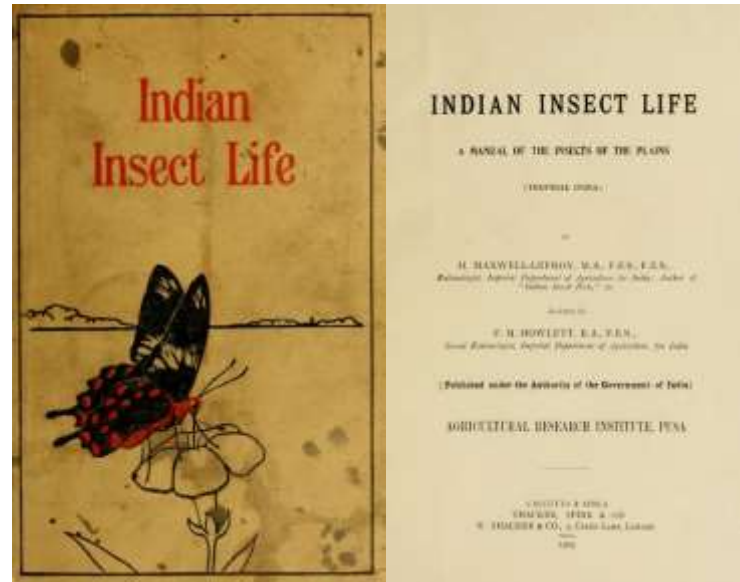
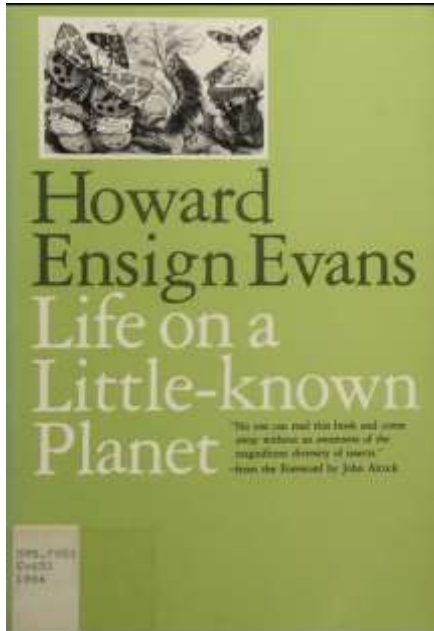
 - communication

- Modification of habitats

 - nest construction

- Sociality

Some readings



<https://arvindguptatoys.com/arvindgupta/Toknowafly.pdf>

<https://muscicapa.blogspot.com/2012/05/small-majority.html>